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AN IMPROVED AEROSOL NOZZLE FOR USE ON ENGINE EXHAUSTS

By A. H. Yeomans
Division of Control Investigations

Aerosol nozzles for use on jeep and airplane engine exhausts were developed during World War II under the Office of Scientific Research and Development. This work was carried on mainly at the University of Illinois under the direction of H. F. Johnstone. Recently a nozzle has been devised in this Bureau which is more efficient and more easily constructed than the previous nozzles and can be used on small trucks and tractors.

This type of nozzle utilizes the heat of the exhaust to lower the viscosity of the oil in the aerosol solution, and the velocity of the exhaust gases to break up the oil. The speed of the engine, the rate of flow of the solution, and the amount of constriction at the nozzle determine the particle size.

The nozzle is constructed of pipe fittings, and very little machining, or special equipment, is required (fig. 1). A 1/8-inch pipe cap (A) is first slotted on both sides with a thin hacksaw blade so that there is 3/32 inch of metal at the center separating the slots. These slots are made 3/16 inch from and parallel to the closed end of the cap. The outside of the cap is then machined down to 17/32 inch (o.d.) from the slot to the open end and 1/2 inch (o.d.) from the slot to the closed end with a slight taper at each end.

The slotted cap (A) is then attached to a 1/8-inch pipe nipple (B) 4 inches long, and a 1/8-inch pipe elbow (C) is attached. Into a 1-1/2-inch pipe nipple (E) 6 inches long is drilled a hole 13/32 inch in diameter 2-5/8 inches from one end. A 1/8-inch pipe nipple (D) 3 inches long is put through this hole and attached to C. A 3/4-inch brass pipe nipple (G) 5/8 inch long is then attached to a pipe reducer (F) 3/4 to 1-1/2 inches in diameter, and the reducer to the pipe nipple E. D is then brazed to E so that A is centered in G. Figure 2 shows the nozzle partly assembled.

The aerosol solution can be supplied from a tank by gravity feed, by air pressure, such as from an army type of hand-pump sprayer, or by a small gear or rotary pump, V-belt driven.

The flexible hose from the solution tank is attached to the pipe nipple D, and the open end of nipple E is attached to the engine exhaust. It may be necessary to slot E about 1 inch deep in four places and then expand it slightly so that it will slide easily over the exhaust line.

When the exhaust outlet is a threaded pipe, the nozzle can be attached with a regular pipe fitting. This type of nozzle is particularly well suited for tractor exhausts. It can be attached directly over the engine by removing the muffler and using an elbow to point the nozzle horizontally.

When the nozzle is attached close to the engine, the back pressure may be excessive. The back pressure should not be greater than 10 pounds, and the average running pressure should be between 5 and 10 pounds per square inch. A small pressure gage can be installed in the line and a 1/2-inch gate valve used to regulate the pressure. Figure 3 shows such a nozzle and relief valve attached to the engine of a 30-horsepower sprayer-duster. The aerosol solution in this case is supplied by the gear pump on the machine, which is so arranged that either the air-blast sprayer or the aerosol nozzle can be used.

Figure 4 shows the nozzle attached to the exhaust of a pick-up truck. In an assembly of this type considerable heat is dissipated before reaching the nozzle. For this reason the aerosol solution is more difficult to atomize and the output should be reduced. The entire exhaust line should be tight for this method of attachment.

To release the aerosol solution the engine speed should be as high as can be maintained with safety. The nozzle should be allowed to heat up for a minute or two, and the rate of flow should then be adjusted so that no blue smoke emerges, which indicates too small a particle size. If the flow is too great, a heavy spray is released and large particles fall just in front of the nozzle. The rate of flow should be about 1/3 quart to 2 gallons a minute, depending on the particle size required.

This type of aerosol dispenser should be used in the same manner as other aerosol field machines. In the field the aerosol should be released about 1 hour after sunset on the windward side of the area to be treated. A suitable aerosol formula contains 5 pounds of technical DDT dissolved in 2 gallons of xylene and then in 3 gallons of 10W motor oil.

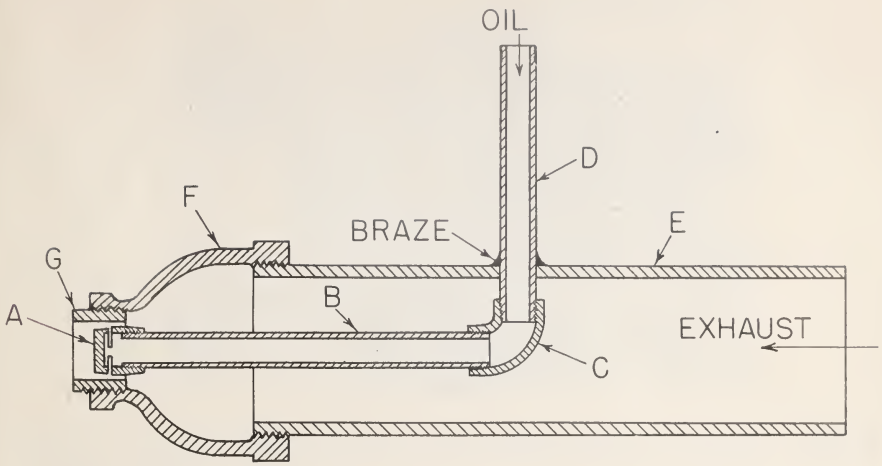

Figure 1.--Exhaust aerosol nozzle.

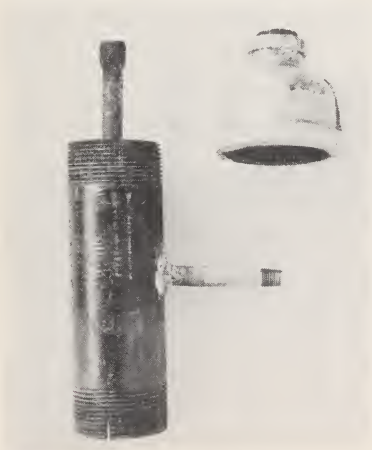

Figure 2.--Exhaust aerosol nozzle partly assembled.

Figure 3.--Aerosol nozzle attached to the exhaust of a 30-horsepower sprayer duster. This photograph shows the method of attaching a pressure gage and relief valve.

Figure 4.--Close-up of aerosol nozzle attached to the exhaust of a pick-up truck.